QUESTIONS RELATIVE TO THE BARBERRY ERADICATION CAMPAIGN THAT EVERY FIELD MAN SHOULD BE ABLE TO ANSWER FULLY.

IDENTIFICATION OF BARBERRIES

1. (a) Draw a sketch of leaves, branches, flower clusters and berries showing the distinguishing characteristics of (Berberis vulgaris).
   (b) Draw a sketch of leaves, branches, flower clusters and berries showing the distinguishing characteristics of (Berberis thunbergii).
   (c) What color are the blossoms on common and Japanese barberries? When do the blossoms appear?
   (d) What shape are the berries of the common barberry? The Japanese barberry? How many seeds in each? What shape are the seeds?
   (e) Describe the root system of a common barberry.
   (f) Do barberry bushes have stolons?

2. (a) What is a hybrid barberry? How can a hybrid be produced?
   (b) What procedure would you follow if you found what you thought was a hybrid barberry? Would you rely on your own opinion as to its being a hybrid? Would you condemn it? Suggest greenhouse tests that could be made to verify your decision.

3. How can you determine the age of a barberry bush? A barberry sprout? A barberry seedling?

DISTRIBUTION

4. (a) Is the distribution of barberries related in any way to the migration of settlers?
   (b) From and to what part of the United States is this most evident?
   (c) Is the distribution of barberries related to the operations of nursery salesmen or landscape gardeners?
   (d) Is Berberis vulgaris native to North America? To your State?
   (e) Has Berberis canadensis been found in its natural habitat in your State?
   (f) Has any other native Berberis been found in your State?

5. (a) What is the relation of Mahonia to Berberis? Name species of the genus Mahonia that may be found in the United States. What native Mahonia grow in your State?
   (b) Does Mahonia rust in your State? What are the known susceptible varieties of Mahonia?

STEM RUST

Casual Organism and Hosts

6. What organism causes stem rust? What is its classification? Give in detail the life cycle of stem rust. Make detailed drawings.

7. What organism causes leaf rust? What is its classification? How is it identified in the field? Does it cause serious loss to small grains?

8. (a) Give characters by which Puccinia graminis can be identified under field conditions.
   (b) Make drawings, give form and colors of pustules for all seasons of the year.

9. Is the rust on timothy the same as Black Stem Rust? Is it dependent upon the barberry?

10. (a) What is meant by a specialized (biologic) form?
    (b) How many specialized forms are there? Name common hosts for each.
    (c) Are these specialized forms subdivided, if so, which has the greater number of subdivisions?

11. (a) Name at least 10 hosts of stem rust.
    (b) Name some common grass hosts with their general distribution.

12. Where does stem rust apparently overwinter in the uredinial stage?

13. What is the danger of infection from the north or south in your State?

14. (a) Is there any possibility that stem rust may overwinter in the red or uredinial stage in your State?
    (b) If so, where and give in detail the conditions favorable.

15. (a) At what time of the year would you expect to find the first aecial or cluster-cup stage?
    (b) How long after the appearance of the aecial stage would you expect to find the first pustules on grains or grasses?
    (c) At about what date might you expect to find a general stem rust epidemic in an area free from B. vulgaris?
    (d) Does this depend upon locality or weather conditions or both?

16. Does B. vulgaris at any time during the season seem to cease to be a factor in continuing the spread of rust?

17. (a) Give the details for making a local epidemiology study?
    (b) Give the details for mapping the spread of rust from barberries.

18. (a) What are the two fundamental methods of control of stem rust?
    (b) Are both methods being used at the present time?

19. (a) Outline the weather conditions of a season which would be highly favorable for stem rust development.
    (b) Outline the weather conditions of a season which is unfavorable for rust development.

20. Explain how only parts of a grain field may be rusted, especially if these parts are not contiguous.

SURVEY FOR ERADICATION OF COMMON BARBERRIES

Original Survey

21. What is an original survey? A farm-to-farm survey? A city survey?

22. Give a detailed outline of the method of procedure (a) When beginning the survey of a county. (b) When completing a county. (c) What plan should be followed to insure that no properties are missed along county and state lines.

23. Explain in detail how an original city survey is made. How much of the suburbs of a city should be worked to insure that the rural survey and city survey will neither overlap nor miss territory?

24. Explain in detail how an original farm-to-farm survey is made. Should every house be visited and every property owner interviewed? How carefully should the farmstead be inspected?

25. (a) What are the possibilities for the occurrence of barberries on the premises about an abandoned house?
(b) Should an abandoned road or lane be explored?

26. Suppose common barberry bushes producing berries were found in a farmer's yard - where might you expect to find escaped bushes?

27. How far from the mother bush and to what type of country are barberry seeds carried?
(a) What are the agencies contributing to the spread of barberries?
(b) Beneath what kinds of trees might you expect to find seedlings?

28. How long do you think the seeds of barberry can remain in or on the ground and still produce seedlings under favorable conditions?

29. Give details for mapping an area of escapes.

30. If you found an almost inaccessible wooded area infested with common barberries, what method would you recommend for finding and destroying these bushes?

31. What are the precautions to be taken when surveying stream banks, fence rows, wooded hillsides, wooded pastures, thickets and swampy ground?

32. How far from fruiting bushes should a careful search for seedlings be made?

Second Survey

33. What is a "Second survey"? How does it differ from an original survey? Does it include both city and rural survey?

34. Can the information gained on the original survey aid in second survey? How?

Resurvey

35. How does resurvey differ from second survey and original survey?

36. Discuss the resurvey problem.
    (a) Should every property, whether city, village, or farm, be revisited and resurveyed?
    (b) If not, why not?
    (c) What properties should be revisited? How often? When?

37. Should a resurvey be carried on in a county just before a second survey is to be started? Discuss fully.

38. How many resurveys may be necessary where fruiting bushes were found on original survey? Discuss with reference to the distribution, viability and germination of barberry seeds.

39. What precautions should be taken when resurveying an area and especially a property on which seedlings and seeding bushes were found on the original survey?

40. Explain in detail the precautions that you would observe in resurveying any area where fruiting bushes but no seedlings had been found.

41. What methods can be used on resurvey in locating barberries that may have escaped observation on previous surveys?

ERADICATION

42. What methods of eradication have been used in the past?

43. What is the best way to destroy a single bush in a lawn? A small hedge between two city lots?

44. What methods may be applied to large hedges in the country?

45. Recommend methods of eradication for bushes in loose soil, rocky or stony ground, in heavy clay, in underbrush and shrubbery.

46. Describe in detail the method of digging a small bush; a large bush; the use of horses in pulling, the use of tractors.

47. Describe the proper way to attach a chain to a bush when using a crowbar to aid in pulling.

Chemical Treatment.

48. What chemical is recommended at present for use in destroying common barberries? Why was the use of sodium arsenite discontinued? When salt is used, how much, what kind, and how applied? Where obtained?

49. How much salt would it be necessary to use on a bush 1 foot across at the surface of the ground? Eighteen inches?
How much salt would you apply to a bush of three small stems? How much to a clump of bushes ten feet in diameter? What is the smallest quantity that will be effective to even a very small bush?

50. Does it make any difference if you let the bush stand or cut it off? Is there any advantage in either? What times of year can salt be applied?

51. Would the treatment be effective if livestock were allowed to run in the pasture and scatter or eat the salt?
How would you prevent livestock from scattering salt? From eating it?

52. Is there any danger to livestock or poultry as a result of chemical eradication with salt? How can this danger be reduced to a minimum? What would you do if cattle must run in a pasture where wild barberries have been salted and it has not been possible to cover the salt?

PUBLICITY

53. Name three Federal Department publications dealing with stem rust and barberry eradication, giving their authors and numbers.

54. Name all of your State publications dealing with stem rust and barberry eradication, giving authors and numbers.

55. Prepare a short story that will give the essentials necessary to announce the arrival of a squad of barberry field assistants in a given locality.
(a) What type of story or interview should be given for publication? What are the most important items?
Explain the use of newspaper cuts and cartoons.
(b) Where would you place posters?

56. (a) With whom should you establish connections when first entering a county to begin a survey.
(b) Where can you get maps or other information about roads?
What business men can be of assistance to you?
(c) Whom do you think would be willing to give space for a window demonstration?

57. With what civil officers would it be well to establish diplomatic relations when beginning work in a town or county?

GENERAL

58. (a) What are the estimated losses from stem rust in your State for each of the past four years?
(b) For the entire United States?

59. (a) When was the Barberry Eradication Campaign in the United States first started? Name the 13 States cooperating.

(b) Why are barberries not removed in the South?
(c) How long since nurserymen in your State discontinued the sale of common barberries.
(d) If we are trying to eradicate barberries in the 13 North Central States, why do Eastern nurserymen continue to advertise common barberries in catalogs which they distribute in these States?

60. Give the number of plantings and bushes found, number of counties covered, and number to be covered in the survey in your State.

61. In what parts of the eradication area have the greatest number of barberries been found?

62. Give briefly the history of barberry eradication in European countries and the results. (British Isles, France, Germany, Scandinavian countries, Austria, etc.)

63. What are the indications in your State that barberry eradication will control stem rust? In neighboring States?

64. (a) What authority has a Federal field man to enter upon and inspect property for barberries?
(b) Under whose authority can barberries be removed?

65. (a) What is the status of enforcement of barberry eradication in your State?
(b) Where and of whom do you ask assistance?

66. What is the Conference for the Prevention of Grain Rust? What is its purpose? Where are its offices? Who is the representative of the U. S. Department of Agriculture located there?

67. Who are the following men, what is their connection with barberry eradication, and what are their addresses?

(a) Hon. H. C. Wallace
Dr. W. A. Taylor
Dr. C. R. Ball
Dr. H. B. Humphrey
Dr. E. C. Stakman
Dr. F. E. Kempton
N. F. Thompson
E. B. Lambert
M. N. Levine
Harrison Fuller
Carleton Hanton
Donald G. Fletcher

(b) To what Washington office should all correspondence relative to barberry eradication be addressed?
(c) What is the address of your State Leader?
(d) Name the personnel cooperating in the barberry eradication campaign in your State.

68. How would you answer John Jones, a Sand County farmer, who stated that the barberry field assistants found a hedge of common barberry next to his wheat field this year and the stem rust was no worse in his field than in other wheat fields in the same neighborhood?

69. (a) Explain why barberry bushes in close proximity to a grain field may be heavily rusted, but no rust occurs on the grain.

(b) A farmer says he has not observed any rust since 1916; have you reasons to believe his statement correct and why?

70. Suppose John Jones says that he observed a great deal of black stem rust in your State long before any barberries were growing; how are you going to answer him?

71. What are you going to say when the property owner says there is no grain grown around here, so why take out the barberries?

72. Outline the steps necessary to prove to a doubting farmer that common barberry is responsible for the initial spread of stem rust in the North-Central, grain-growing States.

73. What statement will you make when a housewife asks you if you are going to replace the barberries you have removed?

74. Why could not an owner agree to spray his barberry plants and thus prevent the possibility of an infection?

75. How would you make your explanation of the development of stem rust agree with the statement that hot muggy weather after several cool dewy nights causes wheat to rust?

76. By means of a drawing locate the northwest quarter of the northeast quarter of the southwest quarter of Section Six. How many acres in a quarter of a section?

77. How many square miles in a township? How many sections?

78. What is the average number of townships in a county?

79. Discuss fully the responsibilities which a field man has to the institutions (Federal and State) which he represents relative to his conduct, thoroughness, honesty, friendliness and sincerity.

80. Suggest a relatively cheap but effective means of finding the last harmful barberry in your State.

81. What educational cooperative plan should be carried on in your State to advance public interest in the campaign?

82. How may the State keep barberries out and see that all seedlings or missed bushes are destroyed?

RELATED PLANT DISEASE QUESTIONS THAT EVERY MAN IN BARBERRY ERADICATION SHOULD BE ABLE TO ANSWER FULLY

1. Name and give distinguishing characteristics of the principal cereal diseases occurring in your State. Give latest approved control measures.

2. What are the dangers in the use of concentrated formaldehyde method with wheat.

3. What is Bordeaux mixture? How made? For what type of disease used?

4. What is lime sulphur? For what plant diseases used?

5. Give the methods of potato seed treatment recommended in your State.

6. Give the life cycle, means of identification, and control for cedar-apple rust?

7. Give the life cycle, means of identification, and control for white pine blister rust.

8. (a) Give sprays recommended for the control of mildews on roses?
   (b) Give sprays or dusts recommended for the control of insects on rose bushes and such garden plants as tomatoes, squash, cucumbers and potatoes.

9. Name the hosts of fireblight. How is it controlled?

10. What shrubs may be used to replace common and purple leafed varieties of barberry?

11. What is the annual production of each cereal in your State?

12. What is the importance of reporting plant diseases to the plant pathologist at the State Agricultural College?

13. What use is made of these reports?

14. If farmers ask about other plant diseases, animal diseases, cultural methods, weed control and other agricultural problems, how much time should you take and to whom should they be referred? How should this reference be made - verbal or in writing.

REFERENCES

1. The Black Stem Rust and the Barberry, by E. C. Stakman, Yearbook Separate No. 796.

2. Destroy the Common Barberry, by E. C. Stakman, Farmers' Bulletin 1058. 3rd Rev. Feb. 1923.

3. Progress of Barberry Eradication, by F. E. Kempton, Dept. Circ. 188.

4. Progress of Barberry Eradication, 1922, by F. E. Kempton, Reprint from Cereal Courier of December 31, 1922.

5. Kill the Common Barberry with Chemicals, by Noel F. Thompson, Dept. Circ. 268. March 1923.

6. Barberry Eradication prevents Black rust in Western Europe, by E. C. Stakman, Dept. Circ. 269. April, 1923.

7. Progress of Barberry Eradication, 1923, by F. E. Kempton. Reprint from Cereal Courier of January 31, 1924, Vol. 16, No. 2.

Issued in 1917-1918

1. Biologic Forms of Puccinia graminis on Cereals and Grasses, by E. C. Stakman and F. J. Piemeisel. U. S. Dept. Agr. Jour. Agr. Research, Vol. 10, No. 9, p. 429-495. August, 1917.

2. Another Strain of Puccinia graminis, by Leo E. Melchers and John H. Parker. Kans. Agr. Exp. Sta. Circ. 68. May, 1918.

3. A Third Biologic Form of Puccinia graminis on Wheat, by M. N. Levine and E. C. Stakman. U. S. Dept. Agr., Jour. Agr. Research, Vol. 13, No. 12, p. 651-654. June, 1918.

4. Can Biologic Forms of Stem Rust on Wheat Change Rapidly Enough to Interfere with Breeding for Rust Resistance?, by E. C. Stakman, John H. Parker, and F. J. Piemeisel. U. S. Dept. Agr., Jour. Agr. Research, vol. 14, no. 2, p. 111-123. July, 1918.

5. Plasticity of Biologic Forms of Puccinia graminis, by E. C. Stakman F. J. Piemeisel, and M. N. Levine. U. S. Dept. Agr., Jour. Agr. Research, vol. 15, no. 4, p. 221-249. October, 1918.

Issued in 1919

1. Effect of Certain Ecological Factors on the Morphology of the Urediniospores of Puccinia graminis, by E. C. Stakman, and M. N. Levine. U. S. Dept. Agr., Jour. Agr. Research, vol. 16, no. 2, p. 43-77. January, 1919.

2. New Biologic Forms of Puccinia graminis, by E. C. Stakman, M. N. Levine, and J. G. Leach. U. S. Dept. Agr. Jour. Agr. Research, vol. 16, no. 3, p. 103-105. January, 1919.

3. The Epidemiology of Cereal Rusts in General and of the Black Stem Rust in Particular, by M. N. Levine. Mimeographed paper. January, 1919.

4. The Parasitism of Puccinia graminis tritici Eriks. and Henn. and P. graminis tritici-compacti Stak. and Piem., by Julian G. Leach. Phytopathology, vol. 9, no. 2, p. 59-88. February, 1919.

5. Stem Rust of Grains and the Barberry in Wisconsin, by A. G. Johnson and James G. Dickson. Wis. Agr. Exp. Sta. Bul. 304. August, 1919.

6. Cereal Rust of Small Grains, by I. E. Melhus and L. W. Durrell. Iowa Agr. Exp. Sta. Circ. 62. November, 1919.

7. A Comparative Morphological Study of Aecia of Four Different Rusts Found upon Barberries in North America, by H. R. Rosen and R. S. Kirby. Phytopathology, vol. 9, no. 12, p. 569-573. December, 1919.

Issued in 1920.

1. The Barberry in Iowa and Adjacent States, by L. H. Pammel. Proc. Iowa Acad. Sci., 26 (1919), p. 193-237, fig. 52-82. 1920.

2. Relation of the Barberry to Stem Rust in Iowa, by I. E. Melhus, L. W. Durrell and R. S. Kirby. Iowa Agr. Exp. Sta. Research Bul. 57, p. 283-325, 2 pl. fig. 1-19. January, 1920.

3. Barberry Eradication, by A. N. Hume and Henry C. Gilbert. S. Dak. State Col. Ext. Circ. 33, 24 p., 10 fig. April, 1920.

4. Puccinia graminis on Native Berberis canadensis, by E. C. Stakman and L. J. Krakover. Phytopathology, vol. 10, no. 5, p. 305-306. May, 1920.

5. Genetics of Rust Resistance in Crosses of Varieties of Triticum vulgare with Varieties of T. durum and T. dicoccum, by H. K. Hayes, John H. Parker, and Carl Kurtzweil. U. S. Dept. Agr., Jour. Agr. Research, vol. 19, no. 11, p. 523-542, pl. 97-102. September, 1920.

6. The Effect of Citric Acid on the Germination of the Teliospores of Puccinia graminis tritici, by A. F. Thiel and Freeman Weiss. Phytopathology, vol. 10, no. 10, p. 448-452, 1 fig. October, 1920.

Issued in 1921

1. Resistance to Stem Rust in Kanred Wheat, by Ruth F. Allen. Science, n. s., vol. 53, p. 575-576. June 24, 1921.

2. Comparative Resistance of Varieties of Oats to Crown and Stem Rust,

by L. W. Durrell and John H. Parker. Iowa Agr. Exp. Sta. Research Bul. 62, p. 27-56d, 4 pl., 7 fig. October, 1920 (issued October, 1921).

Issued in 1922.

1. Rust Resistance in Winter Wheat Varieties, by L. E. Melchers and John H. Parker. U. S. Dept. Agr. Bul. 1046. May, 1922.

2. The Determination of Biologic Forms of Puccinia graminis on Triticum spp., by E. C. Stakman and M. N. Levine, Minn. Agr. Exp. Sta. Tech. Bul. 8. July, 1922.

3. The Relation of Temperature and Hydrogen-ion Concentration to Urediniospore Germination of Biologic Forms of Stem Rust of Wheat, by C. R. Hursh. Phytopathology, vol. 12, no. 8, p. 353-361. August, 1922.

4. Wheat Stem Rust from the Standpoint of Breeding, by H. K. Hayes and E. C. Stakman. Proc. West Canada Soc. Agron. (Winnipeg)

5. A Study of the Environmental Conditions Influencing the Development of Stem Rust in the Absence of an Alternate Host. 1. Viability of the Urediniospores of Puccinia graminis tritici, Form 3, by Geo. L. Peltier, Neb. Agr. Exp. Sta. Bul. No. 22.

Issued in 1923.

1. A Cytological Study of Infection of Baart and Kanred Wheats by Puccinia graminis tritici, by Ruth F. Allen. U. S. Dept. Agr., Jour. Agr. Research, vol. 23, no. 3, p. 131-151, 6 pl. January, 1923.

2. A Study of the Environmental Conditions Influencing the Development of Stem Rust in the Absence of an Alternate Host. 2. Infection Studies with Puccinia graminis tritici. Form 3, and Form 9, by Geo. L. Peltier, Neb. Agr. Exp. Sta. Bul. No. 25.

3. Eradication of Common Barberry and Black Stem Rust in Ohio, by John W. Baringer and Wilmer G. Stover. Ohio State Univ. Agr. Col. Exten. Serv. Bul., v. 18, no. 13, 16 p., 6 fig. 1923. (In cooperation with Office of Cereal Investigations).

4. Common Barberry and Black Stem Rust in Indiana, by K. E. Beeson. Indiana Agr. Exp. Sta. Ext. Bul. 118, 8 p., 7 fig. June, 1923.

5. The Mode of Inheritance of Resistance to Puccinia graminis with Relation to Seed Color in Crosses between Varieties of Durum Wheat, by J. B. Harrington and O. S. Aamodt. In Jour. Agr. Research, v. 24, no. 12. p. 979-996, 4 pl. June 23, 1923. (In cooperation with Minnesota Agricultural Experiment Station).

6. Hydrogen-ion Concentration and Varietal Resistance of Wheat to Stem Rust and Other Diseases, by Annie May Hurd. In Jour. Agr. Research, v. 23, no. 5, p. 373-386. February 3, 1923.

7. A Statistical Study of the Comparative Morphology of Biologic Forms of Puccinia graminis, by M. N. Levine. In Jour. Agr. Research, v. 24, no. 7, p. 539-567, 2 pl. 14 fig. May 19, 1923. (In cooperation with Minnesota Agricultural Experiment Station).

8. Destroy the Common Barberry, by E. C. Stakman, U. S. Dept. Agr. Farmers' Bul. 1058, 14 p., 9 fig. Third revision, February, 1923.

9. Barberry Eradication Prevents Black Rust in Western Europe, by E. C. Stakman. U. S. Dept. Agr. Circ. 269, 15 p. 3 fig. April, 1923.

10. Spores in the Upper Air, by E. C. Stakman, A. W. Henry, G. C. Curran, and W. N. Christopher. In Jour. Agr. Research, v. 24, no. 7, p. 599-605, 2 pl. May 19, 1923. (In cooperation with Minnesota Agricultural Experiment Station).

11. Biologic Forms of Puccinia graminis on Varieties of Avena spp., by E. C. Stakman, M. N. Levine, and D. L. Bailey. In Jour. Agr. Research, v. 24, no. 12, p. 1013-1018, 4 pl. June 23, 1923. (In cooperation with Minnesota Agricultural Experiment Station).

12. Kill the Common Barberry with Chemicals, by Noel F. Thompson. U. S. Dept. Agr. Circ. 268, 4 p., 3 fig. March, 1923.

13. Fighting Black Stem Rust of Grains by Eradicating the Barberry, by Noel F. Thompson and James G. Dickson. Wisconsin State Dept. Agr. Bul. 55, 28 p., 15 fig. May, 1923. (Wis. Agr. Exp. Sta. Bul. 357). (In cooperation with Office of Cereal Investigations).

14. A Study of Rust Resistance in a Cross between Marquis and Kota Wheats, by H. K. Hayes and O. S. Aamodt. In Jour. Agr. Research, v. 24, no. 12, p. 997-1012. June 23, 1923.

15. Progress in Barberry Eradication, F. E. Kempton. Phytopathological Abstracts, v. 13, no. 1, January, 1923.

Issued in 1924.

1. Puccinia graminis on Poa spp. in the United States, by E. C. Stakman and M. N. Levine. In Phytopathological Abstracts, v. 14, p. 17. January, 1924. (In cooperation with Minnesota Agricultural Experiment Station).

2. Progress in Barberry Eradication, by F. E. Kempton. In Phytopathological Abstracts, v. 14, p. 18. January, 1924.

3. Simultaneous Surveys for Stem Rust: A Method of locating Sources of Inoculum. E. M. Freeman and L. W. Melander. Phytopathological Abstracts, v. 14. January, 1924.

Issued in 1899, 1904, 1905, and 1915

1. Cereal Rusts of the United States: A Physiological Investigation, by Mark Alfred Carleton. U. S. Dept. Agr., Div. Veg. Physiol. and Path. Bul. 16. September, 1899.

2. Investigations of Rusts, by Mark Alfred Carleton. U. S. Dept. Agr., Bur. Pl. Indus. Bul. 63. July, 1904.

3. Lessons from the Grain-rust Epidemic of 1904, by Mark Alfred Carleton. U. S. Dept. Agr., Farmers' Bul. 219. 1905.

4. Relation between Puccinia graminis and Plants Highly Resistant to Its Attacks, by E. C. Stakman. U. S. Dept. Agr., Jour. Agr. Research, vol. 4, no. 3, p. 193-200, pl. 28. June, 1915.
